The Eastern Scotian Shelf Integrated Management (ESSIM) Initiative

Developing Objectives and Indicators for Marine Ecosystem-Based Management

Definition of Commonly Used Terms

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DEVELOPING OBJECTIVES AND INDICATORS FOR MARINE ECOSYSTEM-BASED MANAGEMENT

DEFINITION OF COMMONLY-USED TERMS

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Introduction

The development of objectives and indicators for ecosystem-based marine management is a relatively new science. Because of this, there is a need to develop a common understanding amongst practitioners in the field. Obviously this will develop over time, but can be assisted by documenting the current understanding of some of the terms and terminology.

The aim of this document is not to provide an extensive list of definitions but rather to consider, in greater depth, the meaning of some of the terms associated with ecosystem-based marine management and its measurement. Comprehensive glossaries dealing with sustainable development, indicators, environmental reporting and fisheries may be found in the Food and Agriculture Organization glossary (http://www.fao.org/fi/glossary) and the European Environment Agency glossary (http://glossary.eea.eu.int/EEAGlossary).

This document should be viewed as a discussion document, a starting point for developing a common understanding. It is a "living document" that will change over time. The document is split into two sections:

- **Part I:** Discussion of some of the common concepts related to marine ecosystem-based management, objectives and indicators, including some of the terminology commonly used within each concept.

- **Part II:** Glossary of terms likely to be used in developing ecosystem-based objectives and indicators for the Eastern Scotian Shelf Integrated Management (ESSIM) initiative.

Part I: Towards a Common Understanding

Ecosystem-Based Marine Management

The management of human activities so that ecosystem components, functions and properties are restored and/or maintained at appropriate temporal and spatial scales (DFO 2002).

In order to understand ecosystem-based management, an understanding of the term ecosystem is required. The Convention on Biological Diversity (http://www.biodiv.org 2004) defines the term **ecosystem** simply as a *dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit*. The concept is applicable at any scale, from the planet as an ecosystem to a microscopic colony of organisms and its immediate surroundings (http://fao.org/fi/glossary 2004). In practice, ecosystem boundaries of are extremely difficult to define, because of high variation, temporal change, and lack of discreteness (CIFOR 1999).

Ecosystem-based marine management is a goal-oriented management system that ensures planning, development and management of marine resources in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems. This implies that **ecosystem integrity** is maintained where it is the ability to support and maintain a balanced, integrated, adaptive biological community having a species composition, diversity and functional organization comparable to that of natural habitat in the region (CIFOR 1999). The desired outcome of the ecosystem approach is to restore and sustain the health, productivity, and biological diversity of ecosystems and the overall quality of human life through a natural resource management approach that is fully integrated with social and economic goals (IEMTF 1995).

Ecosystem-based management provides for the examination of the different components of the marine environment and must take into account both human and non-human elements and the inter-relationships between the two (Ward *et al.* 2002; Busch *et al.* 2003). It occurs when personal, social, political and management decisions are made whilst taking into consideration ecological information. Ecosystem-based decisions acknowledge that the environment changes, even in the absence of anthropogenic influence. Ecosystem-approach decisions are three-dimensional because they (Busch *et al.* 2003):

- Include stakeholders, perspectives and human goals;
- Consider the health and vitality of ecosystems into the indefinite future; and
- Include the larger landscape and connections among other landscapes.

Ecosystem-based management requires that the intent of such management be defined (goals set) and a process be implemented within management agencies (Busch *et al.* 2003). It is based on a collaboratively developed vision of desired future conditions that integrates ecological, economic, and social factors (IEMTF 1995).

Ecosystem-based management is applied within a geographic framework defined primarily by ecological boundaries. Because ecosystem boundaries are often difficult to define and institutional and administrative boundaries do not co-incide with them, it might be more appropriate to refer to *integrated marine management*, rather than ecosystem-based marine management.

Integrated management is defined by Fisheries and Oceans Canada (2002) as a continuous process through which decisions are made for the sustainable use, development, and protection of areas and resources. Integrated management acknowledges the relationships that exist among different uses and the environments they potentially affect. It is designed to overcome the fragmentation inherent in a sectoral approach, analyzes the implications of development, conflicting uses, and promotes linkages and harmonization among various activities.

Sustainable Development

A development process that takes into account environmental, economic, social and cultural values in meeting the needs of the present without compromising the ability of future generations to meet their own needs (DFO 2002).

The term sustainable development describes an approach to development that aims to provide solutions to all current and future social, economic and environmental problems (e.g. poverty, disease, unemployment, violence, environmental pollution and loss of biodiversity). In essence, sustainable development refers to a kind of development that aims for equity within and between generations, and adopts an approach where the economic, social and environmental aspects of development are considered in a holistic fashion. Monro & Holdgate (1991) elegantly define sustainable development as "*improving the quality of life while living within the carrying capacity of supporting ecosystems*".

In many cases the term has either been used inappropriately or misinterpreted by the audiences who have been exposed to it. Throughout the world many people are confused by the term, mainly because it represents a still as yet unknown and unproven conceptual approach. There are numerous perspectives that have to be incorporated within a general understanding of the term.

One of the major problems with understanding the concept of sustainable development is the fact that it is difficult to visualise the concept being implemented in any practical way because of the absence of real-life model situations where it has been achieved or evidence that it can be measured. The concept thus stands as an ideal situation or state towards which societies should strive. Lankester (Director of the UN Sustainable Development Networking Programme) summarised sustainable development as "development that does not merely generate growth, but also distributes benefits equitably; it regenerates the environment rather than destroying it; it empowers people rather than marginalising them; enlarges their choices and opportunities and it provides for people's participation in decisions affecting their lives. Sustainable development is pro-poor, pro-nature, pro-jobs, and pro-women. It stresses growth, but growth with employment, growth with environment, growth with empowerment and growth with equity" (Walmsley *et al.* 1999).

Ecological (or biophysical) sustainability involves the maintenance of the stability of ecosystems, by limiting stress on them (Sullivan *et al.* 2002). The idea of conservation is central to maintaining ecosystem stability as it means the protection of the resilience of fragile ecosystems (Sullivan *et al.* 2002). Monro & Holdgate (1991) identify three essential components to maintaining the capacity of ecosystems:

- Conserving the life-support systems that nature provides;
- Conserving the diversity of life on Earth (biodiversity); and
- Ensuring that all uses of renewable resources are sustainable.

Economic sustainability can only be achieved if the use of natural resources, the natural capital, is properly accounted and appropriately managed. In many countries, natural capital is depleted as financial capital increases and, while some financial capital can be converted to human gain (*i.e.*, human, social and physical capital) it is inevitably at the expense of the environment. The idea of constant natural capital stock promotes inter-generational and intra-generational equity, and economic and ecological resilience, and it limits uncertainty (Sullivan *et al.* 2002).

Social sustainability relies on both biophysical and economic sustainability. According to the Local Government Management Board of the United Kingdom (LGMB 1995), the characteristics or properties of a "sustainable local society" are the following:

- Resources are used efficiently and waste is minimised by closing cycles;
- Pollution is limited to levels that natural systems can cope with without damage;
- The diversity of nature is valued and protected;
- Everyone has access to good food, water, shelter, and fuel at reasonable cost;
- Everyone has the opportunity to undertake satisfying work in a diverse economy;
- The value of unpaid work is recognised, whilst payments for work are fair and fairly distributed;
- People's health is protected by creating safe, clean, pleasant environments and health services which emphasise prevention of illness as well as care for the sick;
- Access to facilities, services, goods and other people is not achieved at the expense of the environment or limited to those with motor vehicles;
- People live without fear of personal violence from crime or persecution because of their personal beliefs, race, gender or sexuality;
- Everyone has access to the skills, knowledge and information needed to enable them to play a full part in society;
- All sections of the community are empowered to participate in decision-making;
- Opportunities for culture, leisure and recreation are readily available to all; and
- Places, spaces and objects combine meaning and beauty with utility. Settlements are "human" in scale and form. Diversity and local distinctiveness are valued and protected.

Ecosystem-Based Management Objective

Future state or goal determined through a participatory process.

Although an objective can be defined simplistically as a future state that needs to be achieved, they are also used to identify and set desired ecosystem conditions, measurable indicators for monitoring and evaluation, and operational measures and actions to ensure that conditions are met and maintained (DFO 2003).

There are different levels of objectives that can be set. The Australian system for ecologically sustainable development (ESD) of fisheries splits objectives into core objectives and operational objectives (SCA-FRDC Project Team 2001). In the Canadian context these have been referred to as:

- **Conceptual objectives**, or high-level, qualitative objectives, which provide a statement of vision for the future that has been agreed upon by stakeholders. These are generally couched in less specific language, and are founded on the principles of ocean management (in Canada's case, as determined by the Oceans Act, *i.e.*, sustainability, precautionary approach, *etc.*)

- **Operational objectives**, which are "lower-level" objectives or goals that can be practically implemented. They should have a direct and practical interpretation in the context of a resource and should be able to be evaluated through some measure of performance. Operational objectives can include various types of objectives including:

- **Ecosystem objectives:** Objectives describing the desired state of the ecosystem, habitat or species, sometimes referred to as a **conservation objective** (Fowler 2003). These should not encompass the effects of human activity or responses to these activities.

- **Management objectives:** Formally established, more or less quantitative targets that are actively sought and provide a direction for management action (FAO 1997) or, similarly, the regulation or direction of human activities needed in order to achieve an ecosystem objective (Fowler 2003). ESSIM uses the term **sustainable use objectives**, which is a subset of management objectives and are aimed at maintaining healthy connections between humans and the resources and ecosystems upon which they depend.

Another term that has been used relating to objectives is **strategic objective**, which is defined as a target adopted by an authority to guide its work. The purpose is usually to direct action and resources towards achieving a desired goal or outcome (Fowler 2003). Strategic objectives may be purely aspirational and are similar to conceptual objectives, but are generally derived through a strategic planning process.

Indicator

A parameter that provides information about an environmental issue with a significance that extends beyond the parameter itself (OECD 1993; Reinikainen 2002).

In essence, an indicator is a measurable (ideally quantitative, sometimes qualitative) feature that may be used to monitor or to track past performance. Differences in approaches are evident when one looks at the various types of indicators, which are generally defined by their use and the parameters that they are used to assess (Smeets and Weterings 1999). They include:

- **Descriptive indicators** describe the current status and historical trends of a variable, but are not connected with a concrete policy target (adapted from EEA 2000).

- **Efficiency indicators** relate environmental pressures to human activities. They provide insight in the efficiency of products and processes, in terms of the resources used, the emissions and waste generated per unit of output (Smeets and Weterings 1999).

- **Sustainable development indicator /sustainability indicator:** Indicator selected with the aim to provide information on the essence of sustainable development; it may refer to systemic characteristics such as carrying capacities of the environment, or it may refer to interrelations between economy, society and the environment (http://glossary.eea.eu.int/EEAGlossary 2004)

- **Environmental indicators** provide information about or describe the state of the environment and its impact on human beings, ecosystems and materials. Environmental indicators also measure overarching driving forces influencing the system, the pressures on the environment, and management responses. In many instances, environmental indicators are synonymous with sustainability indicators.

- **Environmental headline indicators** are a limited set of indicators that highlight the most important aspects of a particular situation, selected by policy-makers with the advice of information providers. The purpose of environmental headline indicators is to provide simple and clear information to decision-makers and the general public about progress in environmental policies and the key factors determining the state of the environment and whether we are moving towards environmental sustainability. The indicators should be designed to reach the headlines of newspapers (http://glossary.eea.eu.int/EEAGlossary 2004).

- **Performance indicators** compare actual conditions with a specific set of reference conditions. They measure the "distance(s)" between the current environmental situation and the desired situation (target) as a "distance to target" assessment (Smeets and Weterings 1999).

- **Proxy indicators** are developed in a situation when data are not available to populate a preferred indicator. Proxy indicators provide indirect information on a situation, phenomenon or condition that can be used to infer current conditions.

- **Sectoral indicators** show links between the activities of societal sectors (transport, energy, forestry, *etc.*) and the environment. As well, they can measure a sector's absolute burden on the environment and its eco-efficiency. Sectoral indicators deal with a sector's development in size and character and its specific responses to environmental problems. Sectoral indicators can be used to describe progress made in individual sectors, but they also serve to compare sectors.

- **Total welfare indicators** provide a measure of total sustainability (*e.g.*, the Index of Sustainable Economic Welfare, or Genuine Progress Indicators).

- **Ecological indicators** are defined as characteristics of an ecosystem that are related to, or derived from, a measure of biotic or abiotic variables, that can provide quantitative information on ecological structure and function. An indicator can contribute to a measure of integrity and sustainability (http://www.epa.gov/ OCEPAterms 2004)

- **Biological indicators** are a subset of ecological indicators, and may be defined as an organism, species or community whose characteristics show the presence of specific environmental conditions. Other terms used are indicator organism, indicator plant and indicator species (United Nations 1997).

Ecological Quality

An overall expression of the structure and function of the marine ecosystem, taking into account biological, physiographic, geographic and climatic factors, and physical and chemical conditions (including those resulting from human activities).

Ecological quality is a key concept underpinning some of the regional seas programmes, including HELCOM (http://www.helcom.fi//environment/ecoqo_project/ecoqo.html 2004) and OSPAR (Lumb *et al.* 2003), and upon which they have based their indicators programmes. Within this are included two specific terms that require definition:

- **Ecological Quality Element (EcoQ):** Variable aspect of marine ecosystems that may be used to describe ecological quality. EcoQs must be measurable (preferably quantitatively, but in some cases only qualitatively).

- **Ecological Quality Metric:** The measurement scale or dimension by which ecological quality can be measured quantitatively (or qualitatively).

The Strategic Planning Framework for the Eastern Scotian Shelf Ocean Management Plan uses the term **marine environmental quality (MEQ)**, which is defined as a statement of overall condition of the marine ecosystem, and is synonymous with **ecological quality**.

Environmental Performance Evaluation System

A system using environmental, management and performance indicators to quantify, understand and track the relevant environmental aspects of a system, generally related to a desired outcome.

Ecosystem-based management is reliant on regular evaluation to feed back information for adaptive management. The basic idea is to identify indicators (environmental, operational and management) that can be measured and tracked to facilitate continuous improvements (EEA 1998). There are a variety of terms that fall under the umbrella of environmental performance evaluation, including:

Performance measure: A function that converts the value of an indicator to a measure of management performance (SCA-FRDC Project Team 2001). In terms of marine ecosystem-based management, this will be with respect to operational objectives and may include:

- **Reference point/benchmark:** A measurable variable used as a baseline or reference in evaluating performance. Benchmarks may reflect present or historical states, and may be drawn from historical evidence or current knowledge. They are generally used to gauge performance over time.

- **Limit:** Level beyond which the state of a resource component is not considered desirable (adapted from Garcia 1996)

- **Target:** Desired state of a resource component.

- **Threshold:** Level of environmental indicators beyond which a system undergoes significant changes; points at which stimuli provoke significant response. Often the level that indicates that the state of a resource is approaching a target or a limit, and that a certain type of action (usually agreed beforehand) needs to be taken. The purpose of a threshold is to provide an early warning, and might be necessary only for resources or situations involving particularly high risk (Garcia 1996).

- **Guidelines:** Set of operational procedures leading to best practice.

- **Criterion:** A factor against which a situation may be compared for evaluation purposes.

Part II: Glossary of Terms

-A-

Acceptable impact: A negative, or potentially negative alteration of the exploited natural system, resulting from human activities (*e.g.*, fisheries and other impacting industries), the level and nature of which, on the basis of available knowledge, is considered as representing a low enough risk to the resource, system productivity, or biodiversity (Garcia 1996).

Adaptive management: The integrated management and planning process that is adaptive and responsive to the changing environmental, social, cultural, economic and institutional conditions. Ongoing monitoring and regular review of management plans and actions are used to measure and evaluate progress on management objectives and to identify alterations and revisions required to address changing conditions or improved levels of knowledge (DFO 2003).

Attribute: A characteristic of the an ecosystem that appropriately indicates its state and that may be measured quantitatively or qualitatively.

-B-

Benchmark: A measurable variable used as a baseline or reference in evaluating performance. It may reflect present or historical states, and may be drawn from historical evidence or current knowledge (synonymous with reference point).

Best available techniques: The most effective and advanced stage in the development of activities and their methods of operation, aimed at reducing the impact on the environment as a whole (adapted from European Union 1996).

Biological indicator: An organism, species or community whose characteristics show the presence of specific environmental conditions. Other terms used are indicator organism, indicator plant and indicator species (United Nations 1997).

Biological Reference Point: A biological benchmark against which the abundance of the stock or the mortality rate can be measured in order to determine its status. These reference points can be used as limits or targets, depending on their intended usage (Caddy and Mahon 1995).

-C-

Capacity building: Improving and building the technical and managerial skills and resources within an organisation (http://glossary.eea.eu.int/EEAGlossary 2004).

Collaboration: An open, inclusive and transparent planning, advisory and decision-making process involving all interested and affected parties. Ocean management plans and decisions are based on shared information where those with the decision-making authority and those affected by the decision jointly seek outcomes that meet the needs and interests of all parties to the greatest possible degree. Under this approach, those with the authority, power and responsibility to implement agreed-upon management plans and measures will be expected to do so as part of their commitment to the planning process (DFO 2003).

Component: A major area of relevance to resource management within an ecosystem (*e.g.*, target species, bycatch species, marine environment, resource use/allocation, employment, income, lifestyle/culture, governance) (Adapted from SCA-FRDC Project Team 2001) - synonymous with *ecosystem element*.

Conceptual objective: A high-level, qualitative objective, which provides a statement of vision for the future that has been agreed upon by stakeholders.

Conservation objective: Objectives describing the desired state of the ecosystem, habitat or species, sometimes referred to as an ecosystem objective.

Conservation: An approach that ensures the protection, maintenance and rehabilitation of living marine resources, their habitats and supporting ecosystems. Conservation is considered as both a principle to be incorporated into all ocean activities and a use of ocean space and resources in the context of multiple use management (DFO 2003).

Criterion: A factor against which a situation may be compared for evaluation purposes.

-D-

Decision framework: A way of organising and evaluating information (http://www.weathervane.rff.org/glossary/index.html).

Decision-maker: An executive person or group responsible for policy, implementation and allocation of resources (FAO 1993).

Descriptive indicator: Parameter describing the current status and historical trends of a variable.

-E-

Ecological indicator: Characteristic of an ecosystem that is related to, or derived from, a measure of biotic or abiotic variable, that can provide quantitative information on ecological structure and function.

An indicator that can contribute to a measure of integrity and sustainability (http://www.epa.gov/OCEPAterms 2004).

Ecological Quality Element (EcoQ): Variable aspect of marine ecosystems that may be used to describe ecological quality. EcoQs must be measurable (preferably quantitatively, but in some cases only qualitatively (http://www.helcom.fi 2004)

Ecological Quality Metric: Measurement scale or dimension by which ecological quality can be measured quantitatively (or qualitatively) (http://www.helcom.fi 2004).

Ecological Quality: An overall expression of the structure and function of the marine ecosystem, taking into account biological, physiographic, geographic and climatic factors, and physical and chemical conditions (including those resulting from human activities).

Ecosystem approach: An approach that recognizes the complexity of ecosystems and the interconnections among component parts (DFO 2002).

Ecosystem element: A major area of relevance to resource management within an ecosystem (*e.g.*, target species, bycatch species, marine environment, resource use/allocation, employment, income, lifestyle/culture, governance) (Adapted from SCA-FRDC Project Team 2001) - synonymous with *component*.

Ecosystem integrity: The ability to support and maintain a balanced, integrated, adaptive biological community having a species composition, diversity and functional organization comparable to that of natural habitat in the region (CIFOR 1999).

Ecosystem objective: Objective describing the desired state of the ecosystem, habitat or species, sometimes referred to as a conservation objective (Fowler 2003).

Ecosystem structure: Attributes related to the instantaneous physical state of an ecosystem; examples include species population density, species richness or evenness, and standing crop biomass.

Ecosystem wellbeing: A condition in which the ecosystem maintains its diversity and quality and, thus, its capacity to support people and the rest of life (Prescott-Allen 2001).

Ecosystem: A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (http://www.biodiv.org 2004). The concept is applicable at any scale, from the planet as an ecosystem to a microscopic colony of organisms and its immediate surroundings (http://fao.org/fi/glossary).

Ecosystem-based management objective: Future state or goal determined through a participatory process.

Ecosystem-based (marine) management: The management of human activities so that ecosystem components, functions and properties are restored and/or maintained at appropriate temporal and spatial scales (DFO 2003).

Efficiency indicator: Parameter relating environmental pressures to human activities, providing insight in the efficiency of products and processes, in terms of the resources used, the emissions and waste generated per unit of output (Smeets and Weterings 1999).

Enforcement: Ensuring compliance with environmental laws, rules, regulations, or agreements and/or obtain penalties or criminal sanctions for violations.

Environmental accounting (national): Physical and monetary accounts of environmental assets and the costs of their depletion and degradation (http://www.fao.org/fi/glossary 2004).

Environmental assessment: Assessment and evaluation of the causes of environmental problems as well as their magnitude and impact on the region (http://www.unep.org/water/regseas/strategy.htm#env_assessment 2004).

Environmental audit: A management tool comprising a systematic, documented, periodic and objective evaluation of how well a project, organisation or equipment is performing with the aim of helping to safeguard the environment. The audit should facilitate management control of environmental practices and assess compliance with policy objectives and regulatory requirements (European Commission 1999).

Environmental headline indicator: Limited set of indicators that highlight the most important aspects of a particular situation, selected by policy-makers with the advice of information providers. The purpose of environmental headline indicators is to provide simple and clear information to decision-makers and the general public about progress in environmental policies and the key factors determining the state of the environment (http://glossary.eea.eu.int/EEAGlossary 2004).

Environmental indicator: Indicator that provides information about or describes the state of the environment and its impact on human beings, ecosystems and materials. Environmental indicators also measure overarching driving forces influencing the system, the pressures on the environment, and management responses. In many instances, environmental indicators are synonymous with sustainability indicators.

Environmental liability: Liability for damage to nature and environment (adapted from European Commission 2000).

Environmental management plan: An action plan or system which addresses the how, when, who, where and what of integrating environmental mitigation and monitoring measures throughout an existing or proposed operation or activity. It encompasses all the elements that are sometimes addressed separately in mitigation, monitoring and action plans.

Environmental management system: A means of ensuring effective implementation of an environmental management plan or procedures and compliance with environmental policy objectives and targets. A key feature on any effective environmental management system (EMS) is the preparation of documented system procedures and instructions to ensure effective communication and continuity of implementation (European Commission 1999).

Environmental management: Management and control of the environment and natural resources systems in such a way so as to ensure the sustainability of development efforts over a long-term basis.

Environmental performance evaluation system: A system using environmental, management and performance indicators to quantify, understand and track the relevant environmental aspects of a system, generally related to a desired outcome.

-G-

Guidelines: Set of operational procedures leading to best practice.

-I-

Indicator: An indicator is a parameter that provides information about an environmental issue with a significance that extends beyond the parameter itself (OECD 1993; Reinikainen 2002).

Integrated environmental assessment: The interdisciplinary and social process, linking knowledge and action in public policy/decision contexts, and aimed at identification, analysis and appraisal of all relevant natural and human processes and their interactions which determine both the current and future state of environmental quality, and resources, on appropriate spatial and temporal scales, thus facilitating the framing and implementation of policies and strategies (adapted from EEA 1999).

Integrated management: A continuous process through which decisions are made for the sustainable use, development, and protection of areas and resources. Integrated management acknowledges the relationships that exist among different uses and the environments they potentially affect. It is designed to overcome the fragmentation inherent in a sectoral approach, analyzes the implications of development, conflicting uses, and promotes linkages and harmonization among various activities (Fisheries and Oceans Canada 2002).

Integrated resource planning: The management of two or more resources in the same general area.

-L-

Limit: Level beyond which the state of a resource component is not considered desirable (adapted from Garcia 1996).

-M-

Management objective: A formally established, more or less quantitative target that is actively sought and provides a direction for management action (FAO 1997).

Marine environmental quality (MEQ): A statement of overall condition of the marine ecosystem, synonymous with ecological quality.

Marine protected area (MPA): A protected marine intertidal or subtidal area, within territorial waters, EEZs or in the high seas, set aside by law or other effective means, together with its overlying water and associated flora, fauna, historical and cultural features. It provides degrees of preservation and protection for important marine biodiversity and resources; a particular habitat (e.g. a mangrove or a reef) or species, or sub-population (e.g. spawners or juveniles) depending on the degree of use permitted. The use of MPAs (for scientific, educational, recreational, extractive and other purposes including fishing) is strictly regulated and could be prohibited (http://www.fao.org/fi/glossary 2004).

Monitoring: The collection of information for the purpose of assessment of the progress and success of marine management.

Multiple use management: A management and planning process that involves all ocean interests to achieve an acceptable balance of use for a management area, based on agreed-upon environmental, social, cultural, economic and institutional objectives (DFO 2003).

-N-

Natural Capital: The natural assets (*i.e.*, stocks of resources such as land, water, wildlife, biodiversity, and other environmental resources) providing inputs for economic production and from which resource flows useful for livelihoods are derived (http://www.fao.org/fi/glossary 2004).

-O-

Operational objective: "Lower-level" objective or goal that can be practically implemented. It should have a direct and practical interpretation in the context of a resource and should be able to be evaluated through some measure of performance.

-P-

Performance indicator: Indicator that compares actual conditions with a specific set of reference conditions. They measure the "distance(s)" between the current environmental situation and the desired situation (target as a "distance to target" assessment (Smeets and Weterings 1999).

Performance measure: A function that converts the value of an indicator to a measure of management performance (SCA-FRDC Project Team 2001). In terms of marine ecosystem-based management, this will be with respect to operational objectives.

Policy: The definite course or method of action, selected from among alternatives, by a government or its mandated authority(ies), in light of given conditions including legal and constitutional constraints, to guide and determine present and future development and management actions towards satisfaction of agreed objectives.

Policy-maker: Individuals, especially those in official bodies, who have the authority to make decisions about what problems will be addressed within a particular sector and how these problems will be handled.

Precautionary approach: An evaluation and decision-making process that errs on the side of caution and is applied to cases where there is a risk of serious or irreversible harm, significant scientific uncertainty, and a management decision must be taken. The precautionary approach is applied to decisions with potential ecosystem, social, cultural and economic impacts (DFO 2003).

Precautionary principle: Principle adopted by the UN Conference on Environment and Development (1992) that in order to protect the environment, a precautionary approach should be widely applied, meaning that where there are threats of serious or irreversible damage to the environment, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation (http://glossary.eea.eu.int/EEAGlossary 2004)

Prevention principle: Principle allowing action to be taken to protect the environment at an early stage, before damage occurs (adapted from http://glossary.eea.eu.int/EEAGlossary 2004).

Principles: The fundamental policies and philosophies that are used as the basis for action.
Process: The course of action designed to achieve an intended result.

Proxy indicator: Indicator developed in a situation when data are not available to populate a preferred indicator. Proxy indicators provide indirect information on a situation, phenomenon or condition that can be used for inference with regard to current conditions.

-R-

Reference level: A particular level of an indicator (*e.g.*, of fishing effort, fishing mortality or stock size) used as a benchmark for assessment and management performance.

Reference point: A measurable variable used as a baseline or reference in evaluating performance. It may reflect present or historical states, and may be drawn from historical evidence or current knowledge (synonymous with benchmark).

-S-

Scenario: A plausible description of how the future may develop, based on a coherent and internally consistent set of assumptions about key relationships and driving forces.

Sectoral indicator: Indicator showing links between the activities of societal sectors (transport, energy, forestry, *etc.*) and the environment. Sectoral indicators can be used to describe progress made in individual sectors, but they also serve to compare sectors.

Stakeholder: An institution, organisation, or group that has some interest in a particular sector or system (http://www.who.int 2004)

Stewardship: An ethic of active participation and sharing of responsibility to care for ocean ecosystems and resources as parts of a natural life-support system and to sustain and enhance it for generations to come. Stewardship refers to the wide-range of actions and activities of individuals, communities, groups

and organizations acting alone or in partnership, to promote, monitor and conserve biodiversity, to develop and use all natural resources in a sustainable manner, and to maintain the ecosystems on which life depends (DFO 2003).

Strategic objective: A target adopted by an authority to guide its work. The purpose is usually to direct action and resources towards achieving a desired goal or outcome (Fowler 2003).

Sustainability: Ability to persist in the long-term. Often used as a short-hand for sustainable development.

Sustainable development indicator /sustainability indicator: Indicator selected with the aim to provide information on the essence of sustainable development; it may refer to systemic characteristics such as carrying capacities of the environment, or it may refer to interrelations between economy, society and the environment (http://glossary.eea.eu.int/EEAGlossary).

Sustainable development: A development process that takes into account environmental, economic, social and cultural values in meeting the needs of the present without compromising the ability of future generations to meet their own needs (DFO 2003).

Sustainable use objectives: A subset of management objectives, aimed at maintaining healthy connections between humans and the resources and ecosystems upon which they depend.

-T-

Target: Desired state of a resource component.

Threshold: Level of environmental indicators beyond which a system undergoes significant changes; points at which stimuli provoke significant response. Often the level that indicates that the state of a resource is approaching a target or a limit, and that a certain type of action (usually agreed beforehand) needs to be taken. The purpose of a threshold is to provide an early warning, and might be necessary only for resources or situations involving particularly high risk (Garcia 1996).

Total welfare indicator: Measure of total sustainability (*e.g.*, Index of Sustainable Economic Welfare, or the Genuine Progress Indicators).

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